Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/GB05/001640

International filing date: 29 April 2005 (29.04.2005)

Document type: Certified copy of priority document

Document details: Country/Office: GB
Number: 0409923.0
Filing date: 04 May 2004 (04.05.2004)

Date of receipt at the International Bureau: 31 May 2005 (31.05.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

PCT/GB2005/001660

INVESTOR IN PEOPLE

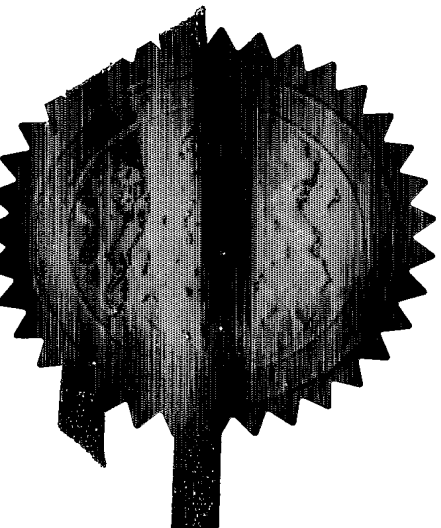
The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed

Dated 19 May 2005

Patents Form 1/77

Patents Act 1977
(Rule 16)

05MAY04 E895313-0 002890
P01/7700 0.00-0409923.0

177

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference — RSJ08100GB — 0409923.0

2. Patent application number *(The Patent Office will fill this part in)* — 0 4 MAY 2004

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

De La Rue International Limited
De La Rue House, Jays Close
Viables, Basingstoke
Hampshire, RG22 4BS
GREAT BRITAIN

Patents ADP number *(if you know it)* 7503612001

If the applicant is a corporate body, give the country/state of its incorporation — Great Britain

4. Title of the invention — METHOD AND SYSTEM FOR FORMING DECODING DEVICE

5. Name of your agent *(if you have one)* — Gill Jennings & Every

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Broadgate House
7 Eldon Street
London
EC2M 7LH

Patents ADP number *(if you know it)* — 745002

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application	Date of filing *(day / month / year)*

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request? — YES

Answer YES if:

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

9. Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form	
Description	10
Claim(s)	4
Abstract	
Drawing(s)	1 + 1

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	
Request for a preliminary examination and search (Patents Form 9/77)	
Request for a substantive examination (Patents Form 10/77)	NO
Any other documents (please specify)	

11. I/We request the grant of a patent on the basis of this application.

For the applicant
Gill Jennings & Every

Signature [signature] Date 04/05/04

12. Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom

SKONE JAMES, Robert Edmund
020 7377 1377

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered YES in part 8, a Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) Part 7 should only be completed when a divisional application is being made under section 15(4), or when an application is being made under section 8(3), 12(6) or 37(4) following an entitlement dispute. By completing part 7 you are requesting that this application takes the same filing date as an earlier UK application. If you want the new application to have the same priority date(s) as the earlier UK application, you should also complete part 6 with the priority details.

METHOD AND SYSTEM FOR FORMING DECODING DEVICE

The invention relates to methods and systems for forming a decoding device to enable hidden information or indicia on an article to be revealed.

It is well known in the security printing business that hand held viewers or revealers can be used to reveal a hidden image in a security printed document. Typically a print element contains a camouflaged code or image that is revealed when the viewer is placed between the eye and the encoded document.

The hidden images and the type of revealer can take several forms. The following approaches are described in the prior art.

WO 01/87632 discloses a print feature consisting of an array of dots in which a security pattern or code is produced by displacing some of the dots with respect to the rest. This cannot be seen with the naked eye. The pattern can be made visible by viewing through a planar device carrying transparent and opaque areas of the same periodicity as the printed dots.

WO 97/20298 discloses a method and apparatus for producing Scrambled Indicia®. This process encodes a message or image into an area of print using digital techniques. The message cannot be seen by unaided eye. When the print is viewed using a lenticular screen of the correct characteristics the hidden image/message is revealed. In some cases different images can be seen at different angles of view. Such scrambled indicia can be incorporated into print or into holographic originations.

Enschede's microSAM™ feature uses screen angle modulation to encode a message or image by modifying the print structure in a manner undetectable by the unaided eye. When the feature is viewed through the correct revealer the hidden message or pattern is seen. The revealer in this case is a piece of plastic film ruled with parallel black lines of the correct pitch and thickness.

WO 01/39138 discloses methods and apparatus for authenticating security documents such as banknotes, passports etc. According to this method, a screen pattern is printed onto a surface. A revealing device is designed so that when it is placed over the printing, it produces a clearly visible message or image caused by the moiré effect. The revealing screen may be a line structure or a microlens array.

GB 1407065 describes a security document carrying a pair of metameric inks which match under one illuminant, say North Sky light, but mismatch under another type of illuminant, such as tungsten. For such a set of inks it is also possible to see a difference in the appearance of the two pairs of such inks by viewing under coloured filters. Commonly, a red filter is used for viewing features. Any mismatch in the absence of a viewer is hidden by overprinting the ink pair by a discontinuous red print design which drops out under the filter.

EP 930979 discloses a self-verifying document and describes a number of methods by which a transparent region on the document can be used to authenticate a document. Microlenses, diffraction gratings, colour filters and moire effects are all referred to.

In all the above effects the security benefits rely on the fact that when the document is copied the structure of the hidden images are not precisely replicated by the copying process. For example this will occur if the resolution of the original image is significantly greater than the resolution of the device used to replicate the image.

Although the technology described in the above prior art provides an effective way of authenticating documents by making use of hidden features in printed security documents it is necessary to have a revealing device appropriate to the feature readily available. Each of the devices described in the prior art will require a viewer specifically designed for that device. Interested users

could be issuing authorities, national banks, commercial banks, forensic laboratories, retailers (both point of sale and back office applications) or the general public. Each level of user could have different security requirements.

Revealing devices can be manufactured and be made available for issue at points of sale, commercial banks etc. However considerable infrastructure is required to manufacture and distribute such items nationwide and possibly farther a field. There is also the concern that the particular revealer is not matched to the feature in question as a variety of structures are possible which could vary from document to document. A reliable means of delivery is required to ensure a cost effective, technically effective and speedy supply of revealers to users.

One approach currently used on plastic banknotes is to provide a viewer on the same document as the printed feature to be decoded i.e. a self-authenticating document. This has the drawback that, for security documents produced on non-transparent substrates, the method cannot be used. In addition there is no control over the level of security control in the issue of viewers. All such revealers are in the public domain. Also the revealer on self authenticating documents can deteriorate by repeated handling as would be the case in circulated documents such as the banknote. The effectiveness of such self-authenticating documents will therefore reduce steadily as they are repeatedly handled.

In accordance with a first aspect of the present invention, a method of forming a decoding device to enable hidden information or indicia on an article to be revealed comprises electronically transferring data defining the decoding device from a central source to a remote site, and creating the decoding device at the remote site using the transmitted data.

In accordance with a second aspect of the present invention, a method of checking the validity of a security

device on an article comprises forming a decoding device at a remote site using data transferred electronically from a central source; and viewing the decoding device in association with the security device to validate the security device.

In accordance with a third aspect of the present invention, a decoding device forming system comprises a central source for providing data defining a decoding device to enable hidden information or indicia on an article to be revealed; a transmission system for transmitting data from the central source to a remote site; and a creation system at the remote site for creating the decoding device using the transmitted data.

In this invention, the decoding device or revealer is created on demand at the remote site using data transferred electronically from the central source. This has a number of advantages. It is convenient for users since they do not need to obtain decoding devices in advance and in addition do not need to store them but can simply download them as required. When there are changes in security features which require different decoding devices, these changes can be implemented at the central source and, in some cases, the user does not even need to know that there has been a change. The problems of degradation in revealing or decoding devices are avoided. Furthermore, of course, the complex infrastructure needed to manufacture and distribute decoding devices is completely avoided.

Typically, the article on or in which the hidden information or indicia is provided comprises a document of value, such as a banknote. However, the information or indicia could be provided on a variety of articles such as banknote cassettes and other secure containers.

Typically, the central source comprises a database which is loaded with data defining the decoding device, for example defining the colour or black and white content of a decoding image. That colour or black and white content may be defined in the form of pixel data or vector data.

Alternatively, it will supply data which defines line structures, dot structures or 3D characteristics that are required for the viewer.

In other cases, however, the central source may include a processor which generates the data in accordance with a predetermined algorithm, on demand.

Examples of decoding devices include an optical filter, a line, or dot pattern, coloured filter, curved line structure, concentric circles, geometric figures, microlens arrays, lenticular screens, lenses and Fresnel lenses. Such devices could be downloaded using systems of the type offered by Z Corporation (http://www.zcorp.com/), Dimension (http://www.dimensionprinting.com/news_pr_sst.html) and Versa Laser (http://www.versalaser.com/english/index.html).

In some examples, the step of creating the decoding device comprises outputting the decoding device on a record medium such as paper, plastic, glass or other suitable material. Other methods include engraving, ablating and moulding. In some cases, the record medium is transparent which enables the security device including the hidden information or indicia to be viewed through the decoding device when the record medium is laid over the security device.

In other examples, the step of creating the decoding device comprises displaying the decoding device on a display screen, such as a high resolution display screen, monitor or high intensity display. In this case, an image is displayed on the screen and the test article or document is placed over the displayed image. The observer will see an effect, image or message appear when the document and screen images are viewed together. The displayed image may be stationary and may take a variety of forms including line structures, dot structures, coloured area, coloured areas, curved line structure, concentric circles or geometric figures.

Alternatively, the displayed image or a component of the displayed image can vary with time. For example, colour, the pitch and/or widths of lines, the pitch or diameter of dots or the geometry of the image may change. When a security device on an article is held over the variable screen image, this can produce different composite images at different times - these images not being apparent by observing the screen or the device alone. By the use of appropriate algorithms (down-loadable from a central website), it is also possible to provide interactive procedures for authentication of an article or document. For example, a key on a computer keyboard can be pressed when a particular image is produced and the status of the system at that time will give an added factor in authenticating the document. This can be used to output an appropriate signal such as a display or audible signal.

The data can be electronically transferred using any conventional transfer medium including the Internet, satellite, cable, PSTN and mobile telephone networks. Thus, the data can be transmitted by email, radio, for example being broadcast by FM, terrestrial TV or satellite sideband. Alternatively, the data could be downloaded direct from a central hub in a point to point manner.

The step of creating the decoding device could be carried out by one of a desk top printer, ink jet printer, laser printer, 3D ink jet printing device, laser engraver, laser marker, laser ablating device, laser cutter, fax machine, commercial ink jet, digital press, conventional press or computer operated machine. The data could be received by any conventional computer, PC, PDA, mobile phone and the like.

In some cases, the data will be transferred to any remote site which requests it. However, it may be desirable in some cases only to release the data to authorised users. To that end, the method may further comprise supplying access control data to the central source to enable the data to be accessed. The accessed

control data could comprise a PIN, password or digital certificate.

In some cases, an image or serial number of the article to be authenticated could be supplied to the central source to enable the correct decoding device to be accessed.

It is highly preferred that the data file carrying the information for production of the viewer should be resistant to tampering. Various security levels of access could be introduced, eg man in the street would have access to low level, commercial bank higher level, central bank even higher level. For example, the man in the street could have access to a colour filter viewer, the commercial bank could have access in addition to a ruled screen viewer and a central bank could in addition have access to a microlens array viewer. Alternatively, viewers with line structures of different dimensions or pitches can be made available at the different access levels either to work with the same area of the document or to work with different areas on the document. Each viewer would then produce its own distinctive image.

Some examples of methods and systems according to the invention will now be described with reference to the accompanying drawing, in which:-

Figure 1 is a schematic block diagram of an example of the system.

The system shown in Figure 1 comprises a central site 1 having a microprocessor 2 coupled with a store 3 which stores pixel data for a variety of different decoding devices. The microprocessor 2 is selectively connectable to a communication network 4 such as the Internet or PSTN by an interface 5 such as a modem.

The network 4 enables data from the store 3 to be transferred to any remote user who connects to the central location. The primary components at a typical remote user site 6 are shown in Figure 1. These comprise a microprocessor 7 coupled via an interface 8 with the

network 4. The microprocessor 7 controls selectively one or both of a monitor 9 and printer 10.

When a user at a remote site wishes to obtain a decoding device, he makes contact using his microprocessor 7 and the network 4 with the central site 1 and supplies an access code such as a PIN together with details of the decoding device which he requires. Once the PIN has been authenticated by the microprocessor 2, the microprocessor obtains the appropriate data from the store 3 and supplies this either encrypted or in clear, via the network 4, to the microprocessor 7. The microprocessor 7 then prints the decoding device by suitably controlling the printer 10 and/or displays the decoding device on the monitor 9. If the decoding device has been printed, the user then takes the printed decoding device and associates it with the security device on the article whose authenticity is to be determined to see whether any hidden information or indicia are revealed. Alternatively, if the decoding device has been displayed on the monitor 9, the user places the security device over or beside the displayed decoding device.

Some examples of particular security devices and corresponding decoding devices will now be described.

Metameric Hidden Feature

An individual or user has a banknote on which is provided a metameric feature that requires a decoding device or viewer in order to be validated. In order to obtain the decoding device the user accesses the secure (web) site 1 using his PC 7 with a suitable network or Internet connection 4. The web site may require the user to provide some form of identifier before providing the decoding device; such an identifier could be the serial number on the banknote. Alternatively the user may be required to identify the issuing authority and denomination of the banknote.

Once the user has provided the required information a data file is made available. The data file in this instance

could have been generated using graphic arts program such as Corel Draw™. In this first example, the decoding device is a filter for viewing printed metameric inks. A decoding device is produced by creating a filled shape, i.e. a red rectangle, which can be saved in any suitable file format, e.g. gif, jpeg, doc etc. This is then printed locally onto a transparent medium such as overhead projector film via an inkjet or colour laser printer 10. The size of the rectangle should be large enough to cover the metameric printed area to be verified. The user then places the printed red filter over the region containing the metameric feature to reveal the hidden image, thus authenticating the security feature. If no hidden image is revealed it indicates the security device may be suspect. Instructions on how to use the decoding device to authenticate the security feature may be provided on screen or printed onto the substrate alongside the decoding device.

Line Grating

As with the above example, a user has a banknote they wish to validate. In this instance the banknote has a concealed feature in a printed image that requires a line grating of a specific frequency in order to be visualised. In order to access the data defining the viewer the user is required to provide an image of the document to be validated. To this end the user must capture the image using a suitable imaging device such as a web cam, digital camera or scanner. The image is then forwarded to the central source 1 where it is used to determine which decoding device to make available to the user. Once the banknote image has been identified the data defining the decoding device is made available to the user. In this instance the data defines an area of repeated black lines again created in a suitable graphics program. This can then be printed onto a transparent medium such as OHP film via an inkjet or laser printer 10. The area of lines should be large enough to cover the printed area bearing

the concealed image. The decoding device can then be used to reveal the concealed printed image.

Metameric Feature 2

In this example, a banknote is provided with a transparent region over which has been printed a specific shade of red to produce a red filter. In order to validate the banknote the user must access a special website 1 and to achieve this, the user may be required to provide some additional information. The additional information may be details about themselves or the note they wish to validate. Once allowed access to the special website an image to be viewed through the filter on the banknote is provided as an image on the monitor 9 displaying the web page. The user then holds the banknote to be validated up to the screen and then looks at the image on the screen through the red filter. If the banknote has the correct type of filter a message or symbol will be revealed.

The image on the monitor 9 could be, for example, a region of green comprising two areas. The first area could be a background and coloured green, the colour being 85, 255, 128 for the hue, saturation and luminance respectively (or R 0, G 255, B 0). The second area could be indicia or a graphical image superimposed on the background and coloured a slightly different green with hue, saturation and luminance values of 64, 255 and 128 respectively (or R 127, G 255, B 0). To the unaided eye, it is not possible to distinguish easily the two areas. However, when the user holds the banknote to be validated up to the screen and looks at the green region on the screen through the red filter, the hidden message or graphical image is displayed. This is due to the absorption of the RGB green emission by the red filter producing a black background while the indicia with 50% red and 100% RGB green appears lighter as the red component is not absorbed by the red filter.

CLAIMS

1. A method of forming a decoding device to enable hidden information or indicia on an article to be revealed, the method comprising electronically transferring data defining the decoding device from a central source to a remote site, and creating the decoding device at the remote site using the transmitted data.

2. A method according to claim 1, wherein the article comprises an article of value such as a document, for example a banknote.

3. A method according to claim 1 or claim 2, wherein the central source comprises a database.

4. A method according to any of the preceding claims, wherein the data defines one or more of the colour or black and white content of a decoding image, a line structure, or a 3-D structure.

5. A method according to claim 4, wherein the data defines the colour or black and white content of the decoding device in the form of pixel data or vector data.

6. A method according to any of the preceding claims, wherein the decoding device comprises one of an optical filter, a line or dot pattern, coloured filter, curved line structure, concentric circles, geometric figures, microlens arrays, lenticular screens, lenses and Fresnel lenses.

7. A method according to any of the preceding claims, wherein the step of creating the decoding device comprises printing, engraving or ablating the decoding device on a record medium.

8. A method according to claim 7, wherein the record medium comprises paper or plastic.

9. A method according to claim 7 or claim 8, wherein the record medium is transparent.

10. A method according to any of the preceding claims, wherein the creating step is carried out by one of a desk top printer, ink jet printer, laser printer, 3D ink jet printing device, laser engraver, laser marker, laser

ablating device, laser cutter, fax machine, commercial ink jet, digital press, conventional press or computer operated machine.

11. A method according to any of claims 1 to 6, wherein the step of creating the decoding device comprises displaying the decoding device on a display screen, such as a high resolution display screen, monitor or high intensity display.

12. A method according to claim 11, wherein the transferred data defines a decoding device whose appearance varies with time.

13. A method according to claim 12, wherein the variation is one or more of colour, the pitch and/or widths of lines, the pitch or diameter of dots, or the geometry of the image.

14. A method according to any of the preceding claims, wherein the data is transmitted by one or more of the Internet, satellite, cable, PSTN and mobile telephone networks.

15. A method according to any of the preceding claims, further comprising supplying access control data to the central source to enable the data to be accessed.

16. A method according to claim 15, wherein the access control data comprises a PIN, password, digital certificate or a serial number of the article.

17. A method according to claim 15, wherein the access control data comprises an image of the article.

18. A method according to any of the preceding claims, wherein the central source is adapted to transfer data defining decoding devices corresponding to different levels of security.

19. A method according to claim 18, wherein the level of security of the transferred decoding device is determined in accordance with the identity of the remote site.

20. A method according to any of the preceding claims, further comprising recording details of the identity of a

user at a remote site requesting data from the central source.

21. A method of forming a decoding device substantially as hereinbefore described with reference to any of the examples and the accompanying drawing.

22. A decoding device which has been formed by a method according to any of claims 1 to 21.

23. A method of checking the validity of a security device on an article, the method comprising forming a decoding device at a remote site using data transferred electronically from a central source; and viewing the decoding device in association with the security device to validate the security device.

24. A method according to claim 23, wherein the article comprises an article of value such as a document, for example a banknote.

25. A method according to claim 23 or claim 24, wherein the security device comprises a hidden code not readily visible to the naked eye.

26. A method according to any of claims 23 to 25, wherein the security device comprises one of an array of dots, scrambled indicia, line pattern and metameric feature.

27. A method according to any of claims 23 to 26, wherein the decoding device is formed on a transparent substrate and is placed over the security device to validate it.

28. A method according to any of claims 23 to 27, wherein the forming step is carried out in accordance with any of claims 1 to 22.

29. A decoding device forming system comprising a central source for providing data defining a decoding device to enable hidden information or indicia on an article to be revealed; a transmission system for transmitting data from the central source to a remote site; and a creation system at the remote site for creating the decoding device using the transmitted data.

30. A system according to claim 29, wherein the creation system comprises one of a desk top printer, ink jet

printer, laser printer, 3D ink jet printing device, laser engraver, laser marker, laser ablating device, laser cutter, fax machine, commercial ink jet, digital press, conventional press or computer operated machine or a display screen, such as a high resolution display screen, monitor or high intensity display.

31. A system according to claim 29 or claim 30, wherein the central source comprises a database.

32. A system according to any of claims 29 to 31, further comprising a processor located at the central source for controlling access to data in the central source.

33. A system according to any of claims 29 to 32, wherein the decoding device comprises an image or indicia which, when viewed in association with a security device, reveals hidden information or indicia within the security device.

34. A system according to any of claims 29 to 33, adapted to carry out a method according to any of claims 1 to 22.

35. A decoding device supply system comprising a central source for supplying data defining a decoding device to enable hidden information or indicia on an article to be revealed, to one or more remote sites.

36. A system according to claim 35, wherein the central source comprises a database.

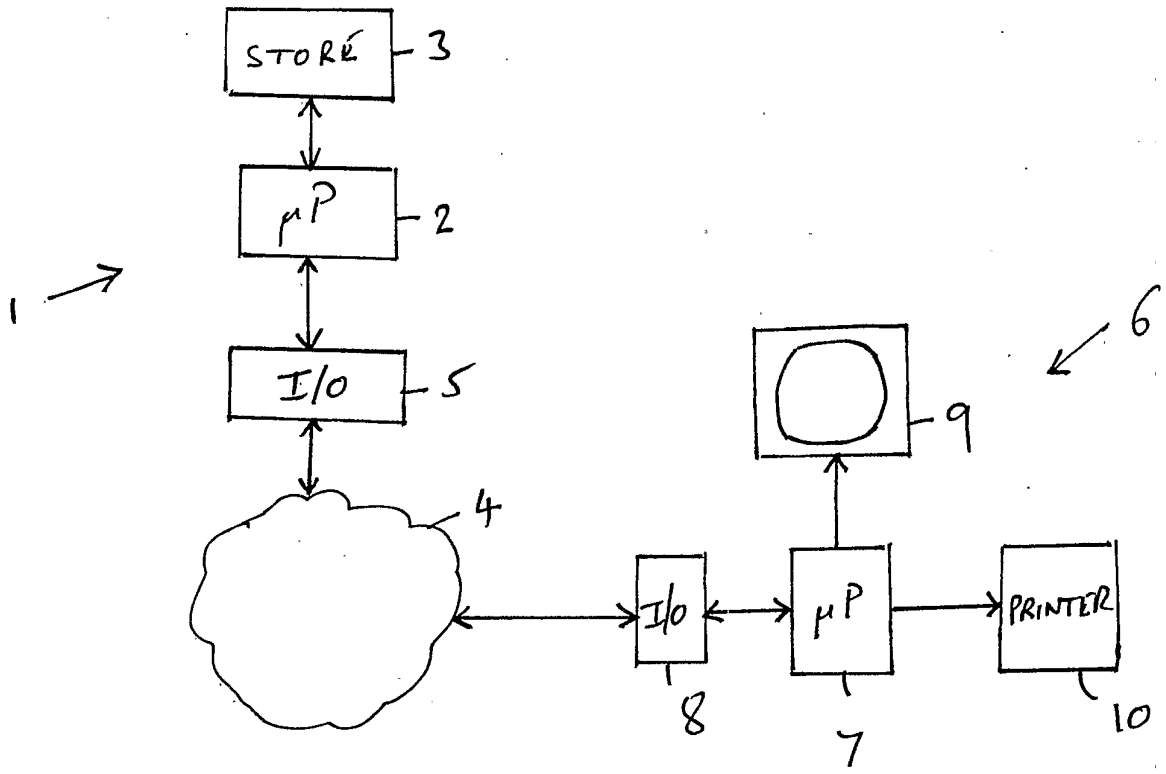


FIG 1